PERCENTAGE OF AN EXTRACTIVE AS A MEANS OF IDENTIFICATION AND ANALYSIS OF DRUGS AND SPICES.

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SINCE the food and drug law has come into existence it becomes very necessary for the analysts to adopt methods for the examination of crude drugs and spices that may be considered the preliminary methods. Frequently not more than the preliminary method need be pursued. Such a method must be as simple as possible, and rapid. For ordinary drugs that have no alkaloidal constituency, aside from the microscopical examination, an estimation of the extractive from the drug is quite satisfactory. We have adopted the method of using the solvents of the U. S. P. for the estimation of such extractives. It is well known that the percentage yield of extractives would be proportionate to the quality of solvent, whether it be equal parts of alcohol and water, or 25 parts of alcohol and 75 parts of water, or 75 parts of alcohol and 25 parts of water, or pure alcohol. The yield of extractive would vary according to the amount of starch and inert matter that would be extracted. We have made some estimations of the simple drugs and have compared these with the experiences of other pharmaceutical chemists, and we find it to be safe to give the table on page 58. First, the name of drug, and next the solvents, and finally the percentage of extractives.

The method of preliminary analysis of the spices is somewhat similar to that of the medicinal drugs. The microscope is unquestionably the most valuable means of detecting adulteration in ground spices, as it furnishes direct ocular evidence and frequently discloses the nature of the foreign material, if present, the chemical analysis being mainly confirmatory.

In 1887 Richardson (U. S. Department of Agriculture, Division of Chemistry, Bul. 13, part 2) published a most valuable report on spices and spice adulteration. The report also contains an analysis of forty-two samples of whole spices, ground in the laboratory of the Department of Agriculture, and of numerous samples of ground spices collected in the open market. Modified methods have been devised since then,

Preparation.	Menstruum. (Parts of U. S. P. alcohol to parts of water or other solvents.)	Extractive Gm. per 100 cc., expressed as percentage.
Apocyanum, U. S. P.	3 to 2	29-32
Arnica flowers, N. F.	Dil. alc.	15-17
Arnica root	3 to 1	10-12
Asclepias	Dil. alc.	11-13
Blue cohosh	2 to 1	24-26
Bryonia	U. S. P. alc.	5-6
Columba, U. S. P.	7 to 3	6-8
Cimicifuga, U. S. P.	U. S. P. alc.	9-11
Echinacea	About 5 to 1	10-13
Eucalyptus, U. S. P.	3 to 1	23-26
Gentian, U. S. P.	Dil. alc.	26-31
Geranium, U. S. P.	3 to 2	26-29
Grindelia, U. S. P.	3 to 1	13-16
Phytolacca root, U. S. P.	Dil. alc.	18-21
Quassia, U. S. P.	1 to 2	5
Quillaja, U. S. P.	Dil. alc.	21-26
Rhubarb, U. S. P.	4 to 1	26
Rhus glabra, U. S. P.	Dil. alc.	21-25
Senega, U. S. P.	About 2 to 1	26-29
Senna, U. S. P.	Dil. alc.	17-21
Taraxacum, U. S. P.	Dil. alc.	21-26
Uva ursi, U. S. P.	2 to about 6½	56-61
Viburnum opulus, U. S. P.	3 to 1	16-19
Viburnum prunifolium, U. S. P.	2 to 1	11-13
Xanthoxylum bark, U. S. P.	3 to 1	11-21

and a variation from these has been made apparently necessary. In the Twenty-second Annual Report of Connecticut Agricultural Experiment Station, 1898, a most excellent paper is published, where 125 samples were collected and examined. Numerous other valuable articles have appeared and are frequently consulted.

Since the food and drug law has come into operation it is absolutely necessary that a rapid preliminary method be had for quickly determining whether a quantitative estimation is necessary, and for this purpose we have found good results in the ether and alcoholic extractives.

Two gms. of the powdered material were extracted with absolute ether, the ethereal tinctures evaporated at ordinary temperature, and finally dried over sulfuric acid. The total ether extract is weighed. The extract is then heated to about 110 degrees to constant weight, this latter weight being the non-volatile extract, and the difference between this and the first weight representing the volatile constituents.

We have been endeavoring to obtain through the use of other extractive solvents, such as petroleum ether, acetone, methyl alcohol, carbon tetrachlorid and chloroform, a series of results. The work has not progressed sufficiently to re-

port, as it is somewhat difficult to obtain results which are concordant. This is unquestionably due to the fact that complete extraction is somewhat difficult to obtain. One result seems at present clear to us, namely: For this preliminary analysis, different spices seem to require different treatment. That is, different solvents must be selected for the different classes of spices, and the treatment of the resulting solutions must vary according to the nature of the spice. A statement will be made later when the examinations of solvents and spices have been completed.